# RATES FOR PUBLIC UTILITIES

With all the attention that has been paid by business men, economists and the public generally to the problems of classification, discrimination and the structure of tariffs in the railroad business, it is rather surprising how little attention has until lately been paid to these same problems occuring in our so-called "public utilities." The situations are fundamentally alike. In each case there are large "overhead expenses" to be met, and met in whatever way may be most just, least burdensome and so gauged as to let the plant do a maximum amount of useful work for the public—up to the limit of its capacity, if possible.

In each case a uniform rate—so much per ton per mile, or per kilowatt-hour, etc., would be sure to be wrong from all these points of view. It would lay burdens on some out of just proportion to the costs they occasion,[1] and would fail to develop much useful business.[2] Yet in only one type of public utility, viz., electric light and power plants—has this problem been generally worked out to anything approaching a clean-cut solution. Customers are classified and charges for different uses and rates of use of current vary scientifically, or, at least, systematically. But gas is still sold by the thousand feet, and the telephone service has still as its points of departure the flat rate which takes no account of amount of service rendered, and the call toll which takes account of nothing else.

How can this state of things be explained? How account for the failure of these businesses to do what the electricity business has done, and what railways did long before, namely, to break away from uniform rates and substitute rates based more accurately on cost, or allowing for commercial conditions? There are a number of very evident reasons. In the first place, the products or services sold are homogeneous, and so anything but a uniform rate seems prima facie unreasonable to most people, much more so than the classifying of articles of freight as this is done by a railroad. All consumers use the same gas, and usually for the same purpose—lighting. Other uses have until rather recently been of

[1] See case in re Menominee and Marinette Light & Traction Co., heard in 1909 by the Wisconsin Railroad Commission. 3 W. R. C. R., 778, 822, 826, 904, 905.

[2] In re Application Manitowoc Gas Co. 3 W. R. C. R., 163, 175. In re Application Medford Light & Heating Co. 2 W. R. C. R., 424.

minor importance and are still primarily domestic. Electricity is more varied in its uses, furnishing power to manufacturing and mercantile establishments under many different circumstances, and often at different voltages. So that in this respect it is perhaps natural that electric utilities should take the lead in differentiating their rates.

In the second place, the matter has attracted no great and vital interest. It is not so important as the railroad question. Discriminations may cause injustice between individuals, but they have no power to pervert the whole workings of industrial competition, to settle who should win and who should lose, regardless of fitness; they cannot present some towns with a career of growth and prosperity and condemn others to relative stagnation. Considering our easygoing American habit, our proneness to let well enough alone in such matters and even to let abuses alone if they are not too bad, it is not strange that we should have failed to spend time and effort in trying to improve on the systems of flat and uniform rates for gas and telephone service. And, finally, the subject is so technical as to be on first sight forbidding to the layman, including the student of economic affairs. He who would study this question, if not educated in the business itself, must learn new meanings for such simple words as "service" and "demand," to say nothing of "connected load," "load factor," etc. Such a beginning hardly entices the average mind to further study, so that these questions must largely be confined to insiders—those in the trade.

And yet few would be inclined to deny that such study is well worth while, or that there is here a chance for improvement that would repay all the cost of the endeavor and leave a satisfactory surplus in more effective use of the equipment devoted to the service of the public. At least one person prominent in both the gas and electricity businesses, Mr. H. L. Doherty, has recorded his belief in the following terms:[3] "Perhaps no other one factor has contributed so much to the success of the electrical business as the study of the rate problem." And further, "To a very large extent this improvement in the electrical business has been to the detriment of the gas business, and that fact alone should have brought the rate problem forcibly to the attention of the gas companies." And this in spite of the fact that the electrical business

[3] From a paper read before a recent meeting of the Commercial Gas Association in Boston. The paper is stimulating, and contains an extensive bibliography.

has by no means reached perfection in this respect: has, in fact, "only reached the point of what might be termed acute interest." In judging of the truth of this estimate it is natural to make some allowance for the enthusiasm of one who has been a pioneer in the reform he is describing, but, even so, the case is a strong one.

However complicated the question of rates may be in practice, the basic ideas are quite simple, and reduceable to two big principles: justice, and the most efficient use of the plant. Justice requires that every consumer or class of consumers should pay all the expenses for which that consumer or group is responsible, provided, of course, the responsibility can be satisfactorily traced. But even if this is not entirely possible, the second principle furnishes a rule that is very like it in its results, although it is most easily expressed in a negative form. If consumers can make extra demands on the utility without paying as much as the extra expense they are causing, they are likely to make wastefully large demands on it, as in the case of telephones with unlimited service.[4] But any consumers who cannot make extra use of the utility without paying many times more than the extra expense they would be causing, will skimp their use, and the tendency will be to keep the central plant in wasteful idleness, as in the case of telephones paying so much per call.[5] In the one case the consumer saves nothing by being frugal, and in the other case he saves several times as much as the company does.

If we suppose that these telephone systems are in use side by side, and that there could be substituted a scheme that would put them on the same basis and make extra calls cost every subscriber about as much as they cost the company, then the flat-rate subscribers would tend to go without some of their most useless calls, while the others would use their instruments more freely, and the net result would be a considerable increase in the benefit of the service to the consumers, while the company could secure the necessary income out of rates which were, in proportion to benefits rendered, lower. From this we get two rules, of which the first is that consumers should be able to enlarge their consumption at rates bearing a just proportion to the low direct cost of such enlarged use of the plant, so that for extra service rendered beyond the minimum amount which most consumers would naturally use in

[4] Example used by Mr. Doherty in paper on *Rates* cited above.

[5] See also In re Application of Medford Light & Heating Co., 2 W. R. C. R., 424.

any case, the rates should normally be lower than the average unit charge. This leaves room for making the total burden on some consumers heavier than on others, in proportion to the cost of the service; in fact, the attempt to develop the use of a utility plant to its fullest capacity may and often does lead to the familiar policy of charging what the traffic will bear, without regard to cost except as a minimum limit.[6] This is a second, or corollary rule developed out of the main principle of maximum use of the plant.

As it is only in the electricity utilities that we find any approach to systematic development of these principles into systems of rates, it will be well to describe the ways in which rates are actually fixed in this industry, and afterward to go on to the question of possible adaptations of the same rules to the needs of the gas and telephone businesses.

The bottom fact in any such system is naturally the analysis of costs, and a complicated business it is. Costs are of course divided into the operating expenses and the "fixed charges," but this, after all, is not the most important thing in rate-fixing. The inquiry of real significance with regard to any outlay, capital or current, is, what is it caused by and with what does it vary, if at all? In an ideal system, every item of cost must be pigeonholed under its proper cause, and these causes must be quantities that can be measured, divided among consumers and used as a basis of rates; and they must, above all else, be simple. The answer to such an inquiry cuts across the first division and makes a new one, in which capital and current outlays rub elbows with each other. Thus in figuring for a water plant the outlays that vary roughly with the capacity of the consumers' individual equipment or "service," we find under this one heading the "fixed" items of interest and depreciation on the consumer's service, the "variable" item of maintenance of this service, and the further expenses of meter-reading, which are pure operating costs.[7] It goes without saying that the kernel of the question is the sharing of the fixed costs: taxes, interest and depreciation on the various parts of the plant. And here the first lesson of experience seems to be that any close approach to a perfect system, while it might be possible, would be too intricate, difficult and expensive for any practical use. Any

[6] Payne et al. *v.* Wis. Tel. Co., 4 W. R. C. R., 1, 57. State Journal Printing Co. et al. *v.* Madison Gas & Electric Co., 4 W. C. R., 501, 671.

[7] Dick et al. *v.* Madison Water Commissioners, 5 W. R. C. R., 766.

working system is a compromise, and so gives room for difference of opinion and controversy that is practically unlimited.

First, there is the central plant. The size of this is determined by the need of being able to meet the largest demand that may be made on it at any one time, and not by the average rate of output, which is considerably less. Now, on the cost or "responsibility" theory, how should this be shared among the consumers? Should the company find out at just what rate each consumer was actually using his service at the "peak," or moment of heaviest demand, during the last year, and use that as a standard? Aside from the injustice of such a measurement, it would be "manifestly impossible."[8] No one can know just how much current each individual customer was taking at, say, five o'clock on the particular December afternoon when the total output per hour chanced to reach its maximum.

The real question to be settled is, it would seem, not the chance coincidence of the past, but the probabilities for the future. According to such data as can be had, what share is each consumer likely to have in the demands which may *in the future* tax the capacity of the plant? The evidence bearing on this includes various items. The company may measure his maximum rate of consumption by "demand meters," if such are in use. Another evidence, easier to obtain, is the maximum rate at which he might use current, or, simply, the capacity of his individual fixtures or "service." To this factor the term "connected load" is given in the electricity business. Or they may measure the maximum demands of considerable classes of consumers, and find how far short this falls of the sum total of the "connected loads." By this means the responsibility of a class would be measured by its actual maximum demand; that of individuals in the class as compared to each other would normally be measured by their maximum possible demand or "connected load."

In this matter of estimating responsibility for investment, the electricity and telephone utilities have one complication which the others escape. They must produce the service at the instant it is consumed, and they cannot store it. This means that they must run at part capacity most of the day for the sake of a momentary peak, while the gas plant can run steadily through the day,

[8] *Report of St. Louis Public Service Commission on Rates for Electric Light and Power,* Appendix B, p. 4.

storing the gas, so that the "peak" it has to allow for is the average of a whole day. As a result, a central gas plant may run, perhaps, at 60 per cent of its capacity on the average,[9] while the efficiency factor of an electric utility may be 25 per cent or less.[10] This is not only an advantage in efficiency of operation, but it makes the rate question simpler, for there is no need to trouble about the time of day at which the service is taken, whereas this question may become an important one to an electric light and power plant. If a consumer agreed not to use current at the time of day, about five o'clock usually, at which the heaviest demand was likely to come, he would, on the cause theory, be freed from all responsibility for the capital cost of the central plant (though not of the distributing system).

But the central plant is not the only capital outlay. The distributing system is also a material item, and the burden of fixed charges on this part of the equipment would, on a strict responsibility basis, fall differently from that of the central plant. Here the cost to serve a consumer varies with his distance from the plant; moreover the maximum demands which determine the size and capacity of the various mains and branches are not likely to come at the same time of the day as the peak of the central plant, nor to bear equal ratios to the connected loads of the consumers whom they serve.

Enough has been said to show that it is beyond the bounds of human possibility to allow for everything. But need an ideal system attempt to allow for everything? It seems that the correctness of the various peak responsibility theories rests on one assumption, one which must often be contrary to fact, viz., that the peak load does actually tax the full capacity of the plant, or is liable to do so at some time in the near future. If this be true, then each consumer may justly be held for his proportionate share. But if the plant is more than big enough to handle the peak load under existing circumstances, then the situation changes. The unused capacity is a waste, and if any new customers could be induced to buy at a price yielding something over the extra cost of serving them, the result would be gain for all concerned, even though the new classes of consumers paid less than the old. Whatever little the new consumers did contribute to meeting fixed expenses would be so much clear gain, enabling the rates of the old

[9] H. L. Doherty, *Rates, op. cit.*, p. 8.

[10] *Report of St. Louis Public Service Commission, op. cit.*, p. 6.

consumers to be just so much lower than if the differential rates had not been established. This principle is so familiar as applied to the classifying of freight by railways that it needs no elaboration here, except to say that concessions need to be subject to much the same limitations of reason and justice in the one case as in the other. In short, then, the rule of peak responsibility would seem to hold strictly only for plants which are likely, at the peak, to be run *at or near their full capacity*, while just in proportion as the capacity of a plant is ahead of its probable peak demand, it is natural and legitimate to make concessions on the principle of "what the traffic will bear," care being taken to avoid unjust and harmful discriminations.

There is a real conflict between the system of cost and that of "value of service" or "charging what the traffic will bear," and the issue would seem to hang, in any given case, on the question whether the capacity of the plant is ahead of the demand, and how far ahead. The natural course of evolution is, first, a stage in which the plant is built for a future demand, not yet developed. In this stage the average rate must be high, and differentials based on what the traffic will bear have a considerable legitimate place. Then follows a stage of increasing demand, approaching nearer and nearer the full capacity of the plant. This lessens unit costs, and the average rate should normally be reduced, by levelling those charges which yield the highest earnings down toward the level of the lower ones, which were made to stimulate business. And, finally, when approximately the full capacity of the plant is reached, the differentials of the old type should have disappeared, and there should be left a system based on cost or responsibility. According to the foregoing theory, it is wrong for a company or a regulating body to prescribe an ironclad system of cost rates without regard to the traffic density, so to speak, as a factor which may justify departures from cost. Another conclusion is, that, inasmuch as a cost system of charges is an evolution from a value system, the final result cannot be expected to be completely, dogmatically accurate, but rather of the nature of a compromise. Let us see to what results this compromise between theory and practice has actually led in the electrical business.

The result of experience has been to eliminate the element of distance from the central station, and all other superfine factors,[11] and to put all expenses into one of three classes: those which vary

[11] H. L. Doherty, *Rates, op. cit.*, p. 10.

approximately with the number of consumers; those which vary approximately with the maximum rate at which current is taken; and those which vary approximately with the amount of current used. This division into "consumer," "demand" and "output" expenses is often further simplified by leaving out the consumer expense as a separate category, and, indeed this was the form used by the earlier pioneers in the development of rate theories.[12] The details of the process of apportioning the expenses into these classes are matters of practical accounting, beyond the scope of the present study.

The first two steps in the making of a cost-schedule, then, are first, to divide the expenses, and second, to settle on a way of determining the individual consumer's share of the capacity expenses. This may be done, as already outlined, by measuring the consumer's maximum demand, and charging him a fraction of the total capacity expense equal to the ratio his maximum demand bears to the sum of the maximum demands of all consumers, or, expressed mathematically:

$$\frac{\text{total capacity expense} \times \text{individual's maximum demand}}{\text{sum of individuals' maximum demands.}}$$

This might be modified by introducing the same factor in both numerator and denominator, as follows:

$$\frac{\text{total capacity expense} \times \text{individual's maximum demand}}{\text{maximum simultaneous demand}} \times \frac{\text{maximum simultaneous demand}}{\text{sum of individuals' maximum demands}}$$

But if on account of the single consumers' peak demands coming at different times, the sum of them all were, for instance, four times as great as the peak demand made at any time on the central plant, then the second fraction reduces to $\frac{1}{4}$, and the whole expression to the following:

$$\frac{\text{total capacity expense}}{\text{maximum simultaneous demand}} \times \frac{\text{individual's maximum demand}}{4}$$

Where the individual consumer's maximum demand cannot be

[12] H. L. Doherty, *Rates, op. cit.*, p. 10.

measured, for lack of suitable meters or because it would not pay to install them, other ways of calculating responsibility become necessary.[13] Here the maximum demand can be actually measured only for considerable classes of consumers, and the amount to be borne by the class as a whole can be found in the same way as that shown above for individuals. Then this must be divided among the members of the class, either equally, or else in proportion to their connected loads, on the assumption that, within the class, the maximum demands are in proportion to the total capacity of their "services" or individual fixtures for use of light or power.

A third possible way, simpler but less just than the above, is to go on the assumption that the capacity costs should be shared in proportion to connected loads, without regarding the fact that some classes of consumers regularly use at certain times the whole, or nearly the whole, of their connected load, while others never use more than a fraction of it at any one time.[14]

Residences, for instance, never as a class put as heavy a strain on the plant in proportion to the capacity of their fixtures as do other classes of consumers. Thus in making tentative calculations for the city of St. Louis, the trial rates which were obtained on a basis of connected load were, for residences, over ten times as high per kilowatt-hour as for the municipal consumption, and between four and five times as high as the rate for business light. On the basis of their actual shares in responsibility for the peak demand, residence rates were less than three times as high as municipal, and only about seventy per cent higher than business rates.[15]

From this showing of discrepancy and of discrimination caused by using as a base the entire connected load, such discriminations bearing heavily on the residence consumers whose connected load gives an exaggerated measure of their real demand on the plant's capacity, it would seem that so far as practicable the more important classes of consumers should have their burdens based on measurements of their actual class demands. Within the classes, the connected load would seem to be the best practicable basis for distributing the class-burden to individuals, except in cases where

[13] *Report St. Louis Public Service Commission, op. cit.,* Appendix B, pp. 3-17.

[14] *Report of St. Louis Public Service Commission, op. cit.,* Appendix C, Table I.

[15] See table cited above.

these would be so nearly alike that a mere equal sharing of the burden would do at least approximate justice.

The above treatment gives a bare outline, without going far into the mathematical formulae involved, of the currently accepted methods of locating responsibility for capacity expenses. This theory is not universally agreed in, however; in fact it has been vigorously combated in the recent report to the St. Louis Public Service Commission by the commission's chief engineer.[16]

These documents present, in contrast to the cause or responsibility theory elaborated above, the use or benefit theory of adjusting these burdens. First, it is claimed that none of the above methods give an accurate measure of responsibility for investment, and, secondly, that such responsibility is not the *only* proper measure by which these costs should be divided. On the contrary, the principle of value of service dictates, first, a general policy of charging according to benefit received, measured by amount consumed (which would lead to uniform rates per kilowatt-hour), and second, miscellaneous concessions based on expediency (or what the traffic will bear). Actual rates, then, cannot be calculated by any one formula, but should be compromises between cost-formula rates, uniform or use-formula rates, and rates governed by mere expediency, such "as may be arrived at by judgment alone."

This proposition, as will be seen, corresponds closely to the position taken in an earlier paragraph of the present paper, namely, that expediency should properly be considered *when the peak load does not tax the full capacity of the plant*, and that the weight given it should normally be in proportion to the extent of the plant's idleness. If this be one of the chief considerations which "judgment" would weigh, then the writer can agree fully to the proposition of the St. Louis report. But when the plant is, at times at least, running at full capacity, the argument against the "responsibility" principle at once loses force. It is even possible to argue that expediency itself dictates the use of "cost" rates. To make this plain, let us suppose as the St. Louis report does, that the hours of the day are separated as if they were different persons, and the peak hour is charged with all the capacity costs and the others with none. This supposition was made in order to show the unfairness of such charges, and it is effective

[16] *Report of St. Louis Public Service Commission, op. cit.*, Appendices B and C.

to the purpose. But how about the expediency of such a policy? What would be the practical effect of it if it could be carried out? Would not the natural result be to cause the peak hour to be avoided as much as possible, and other hours chosen until the peak was virtually no longer a single hour or fraction of an hour, but instead there was a fairly steady rate of use, covering a considerable part of the day and without any short-time maximum worth mentioning? Instead of a peak there would be a plateau wide enough to bear without crumbling the weight of the capacity expenses. And would not this result in more efficient use of the plant without arbitrary personal discrimination; and is not this the highest kind of "*expediency*"? In short, would not a perfect cost system be also a perfectly expedient one, if the necessary data could be gathered? Certainly cost is the basis of expediency, and certainly any approach to uniform rates must seriously hamper development of both of these principles. To this extent the writer is in disagreement with the St. Louis report.

The further criticism that none of the methods described gives an accurate measure of responsibility, would seem to be too purely a logical counsel of perfection, resting on a premise which itself falls short of the perfect standard. This premise is that, in following the cause theory, the capacity costs should be divided according to share in the *peak load on the central plant.* To this the writer cannot agree, because (as mentioned above), much of the capacity expense is for the various mains and branches of the distributing system, and the peak loads on these do not correspond to the peak of the central plant, either in time or in ratio to the average rate of use. Any assignment of these costs on one simple basis is necessarily a compromise between the various peak demands of the various groups which determine the amount to be invested in the different parts of the plant. And the compromise represented by the more generally accepted methods would seem to be as good as practical utility calls for.

Finally, we come to the third step in making a rate system. Having divided costs and laid them separately at the doors of individuals, it remains to decide just what form the rates shall take in practice. The simplest system would seem to be to charge each cost directly to the base that measures it. Thus the consumer would pay the direct consumer expenses as a lump sum, and a further lump sum to cover his share of the capacity expenses, while the output expenses would be covered by a uniform rate per kilo-

watt-hour. This characterises the general type commonly known as "readiness to serve" systems, so called because of the charge made for the provision of capacity which is held ready to serve the consumer's probable demand, separate from the charge for current actually consumed.

While this is the logical system, it meets with certain practical objections. The customers object to a charge that seems to be added to the price they pay for their current; while the law often furnishes obstacles by forbidding meter rents and similar charges that do not in themselves entitle the consumer to any current.[17] As a result, another system of charging finds much favor in practice, a system in which the capacity charge is concealed in the output charge. To do this justly, the rates must be so arranged that few consumers will use so little as to escape their share of the burden, while those who use current many hours a day and regularly, shall not thereby be made to pay more towards capacity costs than others whose peak responsibility is the same, but who use less current.

This could only be perfectly secured by loading all the capacity costs onto the first few kilowatt-hours consumed, so that it would fall practically as a separate fixed charge. The method actually used is to fix on a number of hours daily use of the consumer's maximum demand, representing the average daily consumption of the class of consumers who use the current fewest hours, and to make the rate for this amount of consumption high enough to cover the capacity costs. Beyond this point, the rate falls to a level representing output expense merely. Or perhaps a compromise system is introduced, on the principle advocated by the St. Louis commissioner, and some of the capacity costs are laid upon the second stage of the rate, and not all of them raised from the first.

The result of this system is, in appearance, a sliding scale of charges, but it is governed by very definite principles, and must not be confused with mere reductions for quantity used, regardless of the liability of the consumer to take more, or less, of that quantity at the peak.[18] The latter practice is "not likely to be in keeping with the costs of service or conducive to the successful extension of business."

[17] In re Application Stoughton Municipal Electric Light System, 3 W. R. C. R., 484, 502.

[18] In re Menominee & Marinette Light & Traction Co., 3 W. R. C. R., 778, 831.

Having thus reviewed the charging methods of the electricity business, we come to the question whether these furnish good examples for the other types of utility. And here the answer can clearly be: that any utility which differs from the electric business only in having fewer variations and complications to allow for, can certainly use any system that works well in the electricity business, modifying the accounting details, of course, to suit its special conditions, and cutting out any factors which its greater simplicity renders superfluous. In the supplying of water, residence consumers are so nearly alike, in large classes at least, that capacity costs can be shared among them equally without injustice.[19] And in the gas business, as already noted, such a system of charging would more accurately represent the true investment responsibility, since it is not disturbed by the time-of-day factor, which cannot be comprehensively allowed for by electric companies outside of special contracts to use current "off the peak." To any simpler problem than the one they were designed for, such formulae are obviously adequate.[20]

The telephone rate question is different, in that it has all the complexities of the electrical situation, together with others of its own. Chief among these is the fact that the existing degree of speed and accuracy of service, which are, of course, expensive qualities, are caused, not by all subscribers alike, but by the business subscribers chiefly, especially in cities of some size. Then there is the further fact, that the quality of service rendered one subscriber may be improved by something entirely apart from changes in his own equipment, namely, by connecting him with other subscribers with whom he may some time wish to talk.

Thus there is in this field more latitude for concessions and exceptions under the "value of service" principle than in that of any other public utility business, and no simple rules have as yet shown themselves as sufficient guides in the fixing of rates. Space will not permit more discussion here of this question, which has been treated by writers of more experience.[21]

What suggestions can be made for furthering the desirable

[19] Thos. Kirwin *et al. v.* City of Darlington, 6 W. R. C. R., 26, 41-43.

[20] See water and gas cases of Wisconsin Railroad Commission, W. R. C. C., *passim.*

[21] See paper entitled "Is a Rational Basis for Telephone Rates Possible?" by Prof. D. C. Jackson of Massachusetts Institute of Technology, in *Proceedings of National Municipal League at Buffalo,* Nov., 1910. Also Wisconsin Railroad Commission Reports, *passim.*

growth of rate systems that will promote efficiency and fairness in the utility businesses? One obvious suggestion is the alteration of laws which fix maximum rates on a uniform basis or which hamper the freedom of companies to make separate consumer and capacity charges. Another is the need of systematic study, by experiment, directed to the end that the principles of "expediency," "value of service," and "charging what the traffic will bear" may be used reasonably, and with clear ideas of unit costs for guidance, and not haphazard as they too often are or have been used.[22] Such experiments might well result in increasing the earning power of our public utilities while somewhat lowering the average rate. If this should occur on any considerable scale, what should be the attitude of regulating bodies toward the increased profits so obtained?

The study of differential rates has thus led, as it so often does, to the question of total earnings. And here again it may be questioned whether the American system of control is all that could be desired. Certainly if the principle of a fixed rate of return on the investment were enforced rigidly and all the time, there would be little reason to expect the managers of public utilities to take trouble and possible risk for an improvement that could bring them no gain. They could hardly be expected of their own accord to experiment with their rates in the face of the prospect that, if their experiment were successful, their profits must remain as before and the consumers absorb the whole benefit. And, on the other hand, it is obvious enough that it is not the function of a public utilities commission to order such experiments, as they may order an improvement in the quality of equipment used if it is below standard of efficiency. The argument that regulation of profits to a dead level tends to kill initiative and prevent pioneering, would seem to have lost little of its force.

The other way of handling the situation, and the one that seems best to meet the need in question, is to let the company earn higher profits if it has earned them by an improvement in its service to the public.

The two main things to be seen to in such an arrangement, would seem to be, first, that the extra profit be in proportion to benefit received by consumers in the shape of lower rates or in-

[22] In re Application of Manitowoc Gas Co. 3 W. R. C. R., 163, 175, furnishes an illustration of experimenting to develop off-peak consumption.

creased service, and, second, that it be only for a reasonable period of time. If the businesses in question were very progressive, that period would have to be correspondingly short. With the rapidity of invention and the steadiness of progress that mark the present age, each achievement but opens the way to some other, already in view, and that, in its turn, to others. Last year's innovation may easily be antiquated practice year after next, and it would then be obviously absurd for a company to be still earning extra profits on account of having adopted it, especially if they had done so after it had been tested by others. Even if there be no great danger of such trouble arising in our more static public utilities, still there would be no reason for extending the privilege of extra earnings longer than necessary to give a substantial motive for making the improvements. It would seem that three years should, in most cases, be sufficient.

With these tentative suggestions of policy, this rapid and necessarily incomplete study may conclude. It will have achieved its purpose if it helps to stimulate interest, which seems to be rapidly growing at the present time, in the solving of these important problems, and if it promotes in any degree discussion and clear thinking on issues of such widespread bearing and general interest.

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